

Government of India
Bhabha Atomic Research Centre
Atomic Fuels Division
Technical Services Section

Ref.AFD/TSS/56066

Date 05/04/2017

Sub: Tender enquiry for fabrication, supply, wiring, installation, testing and commissioning of thyristorised controlled power panel for 8-Zone resistance heating furnace.

Fabrication, supply, wiring, installation, testing and commissioning of thyristorised power panel for 8-Zone resistance heating furnace. This panel includes electrical switchgears, thyristorised drive for heater power control, PID controller, data loggers for recording of furnace parameters etc.

Scope of Work:

Sno	Description	Qty.
1.	Fabrication, supply, wiring, installation, testing and commissioning of thyristorised controlled power panel for 8-Zone resistance heating furnace, detail of the same is given in Annexure-I.	1 No

Other details:

1. The completion period of this job should be within 4 months from the date of issue of work order.
2. Persons having valid PVC will be allowed to enter BARC to execute the job.
3. Warranty period should be 12 months after completion of work.
4. The payment will be made after the satisfactory completion of the work.
5. Income. Tax and S.C. as applicable will be deducted from the bill.
6. No Excise & Octroi is payable by the department, if required, necessary exemption certificate shall be issued on request.
7. Any delay which is attributed to the contractor is liable for penalty @0.5 % Per Week (MAX 5%) will be imposed on contractor.
8. The offer shall be forwarded as per following guidelines:
 - a) Quotations are to be on printed letter head / quotation format which should consist of Sales tax registration number registered with local ST authority/CST authority, PAN of the firm, service tax registration number etc. computer generated Quotation shall be considered as invalid & rejected.

Sealed offer with tender no and due date legibly written on the sealed envelope should reach through speed/register post on or before **24/04/2017**

To,

**Mr. Bhupendra Patidar,
Atomic Fuels Division
South Site, BARC
Trombay, Mumbai 400 085.
Email: bpatidar@barc.gov.in**

- b) The contractor shall have to visit the site to comprehend the scope of work and equipment condition. The same will be arranged by the undersigned. The site can be visited between 10/04/2017 to 13/04/2017 on working days between 10:30am to 4:00 pm. however prior intimation of at least three working days is necessary.

The quotation submitted without site visit will not be considered.

Details and Confidentially & Publicity Clause

- I. No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as “proprietary” in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

This clause shall apply to the sub-contractor, consultant, adviser or employees engaged by a party with equal force

- II. “Restricted information” categories under section 18n of the Atomic Energy Act, 1962 and “Official Secret under Section 5 of the Official Secret Act, 1923: -**

Any contravention of the above-mentioned provisions by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequence under the aforesaid legislation.

- III. Prohibition against use of BARC’s name without permission for the publicity purpose:-

The contractor, sub-contractor, consultant, adviser or the employees engaged by the contractor, shall not use BARC’s name for any publicity purpose through any public media like press, Radio, T.V. or Internet without the prior written of BARC. Contractor shall obtain Police verification certificate for all his employees including his supervisors and workers engaged in the work.

**(B. Patidar)
SO/E, TSS, AFD
For & On behalf of President of India**

1. Detail technical specification of thyristorised controlled power panel for 8-Zone resistance heating furnace.

Sr.no.	Name of items	Qty
	<p>Thyristorised controlled power panel for 8-Zone resistance heating furnace.</p> <p>1. MS Powder Coated Power Panel Size:- 1800 mm(H) x 1300 mm (W) x 500mm (D) Power panel with suitable Isolation Transformer, MCB, Heater on/off Switch, R,Y,B Indicating Lamp, Auto/Manual Switch and other switchgear accessories with following Specification</p> <ul style="list-style-type: none"> • MCCB-150Amp, L & T/Siemens/equivalent - 1 No. • MCB (2P) 20Amp, L & T/Siemens/equivalent -3 Nos. • MCB (3P) 20Amp, L & T/Siemens/equivalent - 3 Nos. • MCB (3P) 30Amp, L & T/Siemens/equivalent - 2 Nos. • Isolation Transformer, LTTX-10-150VA LIPL- 1 No. • Energy Meter, Nippen/ Schneider/equivalent - 1 No. • Ammeter (50:5), Nippen/ Schneider/equivalent - 8 Nos. • Indicating Lamps and heater on/off switch, Technik/equivalent- 8 Sets • Auto/Manual Switch - 8 Sets • Ingress protection:- IP54 • Power Wiring & Miscellaneous Switchgear Accessories <p>2. Single Phase Thyristorised Power Controller for 3 kW resistive heater load:- 5 Nos Make:- Eurotherm/Libratherm/equivalent Supply:- 230V ±10% Frequency:- 50Hz Control input:- 4-20mA/0-5V DC/0-10V DC Control method:- Phase angle control Max output limit:- 50 to 100 % adjustable Min output limit:- 0 to 50 % adjustable Mounting:- on the surface of the panel using 4 bolts</p> <p>3. Single Phase Thyristorised Power Controller for 9 kW resistive heater load:- 4 Nos Make:- Eurotherm/Libratherm/equivalent Supply:- 440V ±10% Frequency:- 50Hz Control input:- 4-20mA/0-5V DC/0-10V DC Control method:- Phase angle control Max output limit:- 50 to 100 % adjustable Min output limit:- 0 to 50 % adjustable Mounting:- on the surface of the panel using 4 bolts</p>	<p>1 No</p>

	<p>4. Single Phase Thyristorised Power Controller for 18 kW resistive heater load:- 3 Nos Make:- Eurotherm/Libratherm/equivalent Supply:- 440V \pm10% Frequency:- 50Hz Control input:- 4-20mA/0-5V DC/0-10V DC Control method:- Phase angle control Max output limit:- 50 to 100 % adjustable Min output limit:- 0 to 50 % adjustable Mounting:- on the surface of the panel using 4 bolts</p> <p>5. PID temperature Controller with ramp and soaking function:- 12 nos Make:- Eurotherm/Libratherm/equivalent Input :- 'K' type thermocouple Range :- 0-1200⁰C Resolution :- 1⁰C or better Indicating accuracy:- \pm 1⁰C or better Display:- 4 digit,0.3 inch,7 segment Red LED for process value 4 digit,0.3 inch,7 segment Red LED for process value Tuning:- Manual/Auto tuning Control output:- 4-20mA/0-5V DC/0-10V DC and control (0-100%) Retransmission output :- 4-20mA/0-5V DC/0-10V DC to data logger Relay output:- 2 no (NO/NC contact) Supply:-230V,50Hz Size:- 48mm(H)X48mm(W)x160mm(D) or less</p> <p>6. Temperature data logger :- 2Nos Channels:- 32 Nos Size:- 96mm(H)x192mm(W)x160mm(D) or less Input:- 4-20mA/0-5V DC/0-10V DC Temperature range :- 0-1200⁰C Accuracy:- \pm 1⁰C or better Scan rate :- 1 to 99 sec Data storage interval:- 1 to 99 min. or better Data storage:- 8000 records or more Interface:- RS485 or USB LED indication:- Alarm for each channel Output:- 32 nos of relay output(NO/NC contact)(rating- as per contactor used in power circuit) Supply:-230V,50Hz</p> <p>7. Data logging system for recording of temperature data(No of channels-32 Nos) along with PC :- 1No Window based Data logging software with CD and license Alarm set point for each channels (32 Nos) Graphical display of process parameters (32 Nos) Each channel parameter display as indicator Data shall be saved in Microsoft window compatible format(.xls or .pdf)</p>	
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	Print command to print saved data Password protection for unauthorized entry 8. Control circuit for vacuum and pressurized system with interlock:- 1No	
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Note: -

1. All wire and cable used in electric panel shall be FRLS type.
2. Stranded copper wire of at least 1.5sqmm size shall be used for control wiring.
3. Spacing between electrical components in panel shall be as per the IEC standard.
4. Two earthing points shall be provided on electrical panel.
5. Suitable switchgears shall be provided in electrical panel to protect electrical components from overvoltage, under voltage, over current, short circuit, over temperature etc.
6. Electrical components used in the panel shall be of reputed make.
7. Electrical wiring from power panel to different zone of furnace will be in the scope of supplier.
8. Panel shall be coated in siemens gray with seven tank processing.
9. Proper cooling arrangement shall be made inside the panel to limit temperature with in 40⁰C.
10. Extra space shall be provided in the panel to accommodate switchgear, thyristorised controller, PID controller and other electrical accessories of two heating zone of 3kW and 5kW.
11. The panel shall be designed for continuous operation (24 hrs X 7 Days).
12. Thyristors shall be protected from dv/dt and di/dt.
13. All Electrical components shall comply with IEC standard.
14. Earthing wire colour shall be green or yellow strip.

2. Inspection and test:-

1. Before starting of fabrication, the contractor shall prepare system layout drawing along with wiring diagram and get approved from purchaser.
2. Before leaving the manufacturing work, all equipments shall have been inspected and tested and the results recorded in test report.
3. The manufacturer shall provide test report of each and every electrical components of power panel and submit at the time of inspection.
4. **Following test shall be carried out**
 - 4.1. Temperature rise test: - All thyristorised shall be operated for a minimum of two hours on full load current (reduced voltage, if necessary) and Temperature of these components shall be measured and logged on a chart recorder.

- 4.2. Waveform recording:- The output current and voltage waveform shall be recorded for each heater zone, for varying levels of input signal. The test shall be carried out with full load current available.
- 4.3. Insulation test: - All equipments (Except insulation and thyristor assemblies) shall be tested at a minimum of 500 V DC.
- 4.4. High voltage test: - All equipments (Except insulation and thyristor assemblies) shall be tested with a minimum test-voltage of 1500V AC for 1 min.
- 4.5. Load control test:- A load control test shall be performed to plot the control input against the power output using load bank.
- 4.6. Functional tests: - All components e.g. protective devices, alarm etc. Shall be tested to ensure that they function correctly.
- 4.7. Noise test: - The power and control assembly shall be operated at full load and sound measurement taken at 1 m distance to ensure the maximum noise level is no greater than 70 dbA.

3. Documentation

1. The manufacturer shall supply at least the following drawing /documents in the quantities indicated.
 - 1.1. Single line diagram
 - 1.2. Main and control circuit schematic diagram
 - 1.3. Final assembly arrangement drawing showing main circuits, main dimensions, panel layout, floor plan.
 - 1.4. Bill of material
 - 1.5. Transport, installation, commissioning, operation, maintenance instruction and fault finding procedure.
 - 1.6. List of recommended spare parts
 - 1.7. Test certificate of each panel components
 - 1.8. Operation, configuration and maintenance manual of,
 - PID controller
 - Thyristors controller
 - Data Logger
 - 1.9. Data logging software installation and configuration manual

The above items shall be submitted in the form of two nos of CD and three hard copy.

4. Packing and dispatch

All the equipment shall be divided into several shipping sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship or rail or trailer. The panel shall be wrapped in polyethylene sheet before being placed in the wooden crates or cases to prevent damage to the finish. This side up, centre of gravity, weight, owner particulars, purchase number, shall be clearly marked on the package together with other detail as per purchase order.